

CLAIMS

1. A method of heat treatment of glass materials and natural materials specifically of volcanic origin characterized in that the treated material is exposed to microwave radiation at a frequency range from 1 MHz to 10 GHz and temperature range from the ambient temperature to 1800 °C in a batch or continuous production process.
2. The method of heat treatment of glass and natural materials of claim 1 characterized in that the frequency of micro wave radiation is ranging from 1 to 100 MHz, preferably 27 MHz, from 500 MHz to 10 GHz preferably 896 MHz, 915 MHz and 2450 MHz.
3. The method of heat treatment of glass and natural materials of claim 1 and 2 characterized in that the glass or natural material to be melted or refined and /or refined contains an inert additive elected from the group comprising carbides, nitrides or borides in an amount from 1 to 100 g preferably 5 to 50 g per 1 kg of the glass or natural material.
4. The method of heat treatment of glass and natural materials of claim 3 characterized in that the inert additive is elected from the group consisting of tungsten carbide - WC, silicon carbide - SiC, boron carbide - B₄C, titanium carbide - TiC or vanadium nitride - VN, boron nitride - BN, silicon nitride - Si₃N₄ or titanium boride - TiB₂, niobium boride - Nb₂, vanadium boride - VB₂, tungsten boride - WB₂, zirconium boride ZrB₂, and aluminum boride AlB₂ or a mixture thereof.
5. The method of heat treatment glass and natural materials of any of claims 1 to 4 characterized in that the glass material comprises cullet of common waste glass of any kind or glass batches of all types or mixtures of cullet and glass and glass batches and the natural material comprises basalt, granite, marble, andesite, syenite, and other materials absorbing micro wave radiation.

6. An apparatus for performing the method of any claim 1 to 5 characterized in that it consists substantially of a micro wave furnace comprising an outer shell (8.2) provided with a cover (10) and an inner shell (8.1) and at least one micro wave generator (1.1, 1.2, 1.3, 1.4) with double emission and a total output from 0.1 to 1 kW per 1 kg of the processed glass or natural material arranged substantially in the intermediate space between the outer shell (8.2) and the inner shell (8.1) and a tank (2) disposed inside the inner shell (8.1).
7. The apparatus of claim 6 characterized in that the inner space of the furnace is filled up with a heat insulating material with a heat resistance up to 1750 °C selected from the group consisting of aluminum oxide - corundum or silicon oxide - quartz.
8. The apparatus of claim 6 or 7 characterized in that the furnace cover (10) is provided with at least one safety switch (9.1 and 9.2) and a fill neck (7) engaging a contactless infrared sensor (5) with a connection for transmitting its signal to a thermometer and controller (6) provided with a microprocessor for the microwave generator control.
9. The apparatus of any claim 6 to 8 characterized in that the tank (2) is provided with a side or bottom tapping point (13).
10. Apparatus of any claim 6 to 9 characterized in that the outer shell (8.2) is provided with transporting wheels.